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May 29, 2015

Mary Kauffman
Caribou-Targhee National Forest
1405 Hollipark Dr.
Idaho Falls, Idaho 83401

Subject: **Biological Selenium Removal Treatment Technology**
Fluidized Bed Bioreactor Pilot Study
April 2015 Progress Report

Dear Mary,

This progress report summarizes key activities in April 2015 associated with the fluidized bed bioreactor pilot study located near Hoopes Spring. This pilot study is being conducted as part of the Smoky Canyon Mine Remedial Investigation/Feasibility Study (RI/FS) to provide information on the effectiveness of the active biological treatment system in removing selenium and other COPCs from South Fork Sage Creek Springs and Hoopes Spring. Operation and monitoring of the pilot study follows the *Pilot Study Work Plan and Sampling and Analysis Plan (Work Plan/SAP), Biological Selenium Removal Treatment Technology Fluidized Bed Bioreactor* (prepared by Formation Environmental, dated September 2014, with revised text and tables dated March 5, 2015).

The treatability study pilot for selenium removal at Hoopes Spring has encountered a hydraulic deficiency in the aeration tank to the sand filter portion of the system. This deficiency is being addressed by Simplot's owner-engineer and the construction-build contractor. An interim pumping scenario has been proposed to get the pilot back online and operating as a short-term solution. A work plan is also being prepared for a small, "pilot-in-a-pilot", to test the functionality of ultra-filtration and reverse osmosis as a concentration step for future increased throughput in a planned Phase II for the treatability study pilot.

Identification of Deliverables and Data Transmittals

No analytical or field data were collected in April. However, laboratory results were received for samples collected in March. Table 1 presents results for the full analytical suite for the samples collected on March 31 (the focused analytical suite results and field parameters were presented in the March monthly report). Table 2 presents the selenium species results for the samples collected on March 18 and March 31.

Upcoming Activities

The following activities associated with the fluidized bed bioreactor pilot study are scheduled through June 2015:

- Restart of the pilot system and startup of the small UF/RO skid are expected in late June or early July.
- Addendum 01 to the Work Plan/SAP is in preparation and will be submitted to the agencies in late May or early June. This addendum will provide an updated monitoring schedule and analyses for implementation when the pilot system is restarted.
- A work plan will be prepared for a small, "pilot-in-a-pilot", to test the functionality of ultra-filtration and reverse osmosis as a concentration step for future.

Please contact me if there are questions regarding this monthly progress report.

Sincerely,

Monty Johnson
Environmental Engineering Manager
J. R. Simplot Company

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Table 1
Analytical Results, March 31, 2015

	Station >>	Effluent	Influent
	Sample ID >>	SC0315-LSSHS-EF002	SC0315-LSSHS-IN002
	Date >>	3/31/2015	3/31/2015
Analyte	**Units**		
General Chemistry			
Ammonia as N	mg/L	0.03 U	0.097
Nitrate as N	mg/L	0.05 U	0.327
Nitrate/Nitrite as N	mg/L	0.05 U	0.347
Total Alkalinity	mg/L as CaCO3	200	197
Bicarbonate	mg/L as CaCO3	200	197
Carbonate	mg/L as CaCO3	1 U	1 U
Hardness	mg/L	259	261
Biochemical Oxygen Demand	mg/L	6.1	2 U
Chemical Oxygen Demand	mg/L	5.1	5 U
Calcium, Dissolved	mg/L	64.8	65.7
Magnesium, Dissolved	mg/L	23.6	23.5
Potassium, Dissolved	mg/L	0.796	0.829
Sodium, Dissolved	mg/L	8.08	8.11
Chloride	mg/L	11.4	10
Fluoride	mg/L	0.404	0.389
Phosphorus	mg/L	0.077	0.01 U
Sulfate as SO4	mg/L	48.4	57.1
Total Organic Carbon	mg/L	4.33	1 U
Total Diss. Solids	mg/L	275	272
Total Susp. Solids	mg/L	5	9
Metals and Metalloids			
Aluminum, Total	mg/L	0.036 U	0.036 U
Aluminum, Dissolved	mg/L	0.036 U	0.036 U
Antimony, Total	mg/L	0.00019 U	0.00039 J
Antimony, Dissolved	mg/L	0.00019 U	0.00049 J
Arsenic, Total	mg/L	0.00012 J	0.00046 J
Arsenic, Dissolved	mg/L	0.0001 J	0.00046 J
Barium, Total	mg/L	0.0447	0.0445
Barium, Dissolved	mg/L	0.044	0.0498
Beryllium, Total	mg/L	0.000048 U	0.000048 U
Beryllium, Dissolved	mg/L	0.000048 U	0.000048 U
Boron, Total	mg/L	0.0152 J	0.0138 J
Boron, Dissolved	mg/L	0.0158 J	0.0145 J
Cadmium, Total	mg/L	0.000072 U	0.000072 U
Cadmium, Dissolved	mg/L	0.000072 U	0.000072 U
Chromium, Total	mg/L	0.0004 U	0.00055 J
Chromium, Dissolved	mg/L	0.0004 U	0.00048 J
Cobalt, Total	mg/L	0.00013 J	0.0001 J
Cobalt, Dissolved	mg/L	0.00015 J	0.00016 J
Copper, Total	mg/L	0.00022 J	0.00017 J
Copper, Dissolved	mg/L	0.00015 U	0.0003 J
Iron, Total	mg/L	0.669	0.026 U
Iron, Dissolved	mg/L	0.0689	0.026 U
Lead, Total	mg/L	0.000031 U	0.000033 J
Lead, Dissolved	mg/L	0.000031 U	0.000031 U
Manganese, Total	mg/L	0.0052	0.0024
Manganese, Dissolved	mg/L	0.0054	0.0011
Mercury, Total	mg/L	0.00004 U	0.00004 U
Mercury, Dissolved	mg/L	0.00004 U	0.00004 U
Molybdenum, Total	mg/L	0.0021	0.0023
Molybdenum, Dissolved	mg/L	0.002	0.0025
Nickel, Total	mg/L	0.0022	0.0022
Nickel, Dissolved	mg/L	0.0021	0.0023

Table 1
Analytical Results, March 31, 2015

	Station >>	Effluent	Influent
	Sample ID >>	SC0315-LSSHS-EF002	SC0315-LSSHS-IN002
	Date >>	3/31/2015	3/31/2015
Analyte	Units		
Selenium, Total	mg/L	0.0038	0.11
Selenium, Dissolved	mg/L	0.0018 J	0.117
Silver, Total	mg/L	0.000021 U	0.000021 U
Silver, Dissolved	mg/L	0.000021 U	0.000021 U
Thallium, Total	mg/L	0.000026 U	0.000032 J
Thallium, Dissolved	mg/L	0.000026 U	0.000029 J
Uranium, Total	mg/L	0.0004 J	0.0014
Uranium, Dissolved	mg/L	0.00042 J	0.0016
Vanadium, Total	mg/L	0.00087 U	0.0018
Vanadium, Dissolved	mg/L	0.00087 U	0.0016
Zinc, Total	mg/L	0.001 U	0.0044 J
Zinc, Dissolved	mg/L	0.001 U	0.0061

Notes:

Results presented are preliminary, and have not been validated at the time of this report.

U - Analyte not detected above the method detection limit (MDL).

J - Result is estimated.

Table 2
Selenium Species Results, March 2015

Biological Selenium Removal Treatment Technology
Fluidized Bed Bioreactor

	Station >>	Influent	Bioreactor Effluent	Effluent	Influent	Effluent
	Sample ID >>	SC0315-LSSHS-IN001	SC0315-LSSHS-BE001	SC0315-LSSHS-EF001	SC0315-LSSHS-IN002	SC0315-LSSHS-EF002
	Date >>	3/18/2015			3/31/2015	
Analyte	**Units**					
Dimethyldiselenide	µg/L	0.18 U	0.19 J	0.18 U	0.18 U	0.18 U
Dimethylselenide	µg/L	0.085 U	0.085 U	0.256 J	0.085 U	0.206 J
Selenium (IV)	µg/L	0.19 U	0.46 J	2.28 J	0.15 U	0.15 U
Selenium (VI)	µg/L	109	0.097 U	0.097 U	113	0.12 U

Notes:

Results presented are preliminary, and have not been validated at the time of this report.

U - Analyte not detected above the method detection limit (MDL).

J - Result is estimated.